2011 Update of the Long-term Rocky Intertidal Monitoring Project at Redwood National and State Parks

Why monitor intertidal areas?

Intertidal marine communities were identified as high-priority vital signs. Many intertidal organisms can be useful indicators of impacts or changes due to a variety of environmental perturbations. Monitoring intertidal assemblages allows changes to be tracked within and between communities over seasonal and yearly time scales. Such monitoring is critical for making informed management decisions. Tracking changes in these communities allows the "normal" limits of variation, as well as seasonal and long-term patterns, to be determined. Understanding these patterns is necessary for detecting anthropogenic changes resulting from disturbances such as oil spills or global climate change.

Objectives

This monitoring program was designed to identify and follow temporal trends in populations of specific indicator organisms. This monitoring involves twice-yearly sampling of permanent plots established to monitor a number of important sessile invertebrate and algal species, plots to monitor the ochre star, and transects to monitor surfgrass . These data are used to describe seasonal and annual changes to the community, and explore broader spatial and temporal scales.

The specific monitoring objectives of the RNSP Rocky Intertidal monitoring program are:

- Monitor the temporal dynamics of target invertebrate, algal, and surfgrass species across accessible, representative, and historically sampled rocky intertidal sites at Redwood National and State Parks to: 1) Evaluate potential impacts of visitor use or other park-specific activities; and 2) Provide monitoring information to help assess level of impacts and changes outside normal limits of variation due to oil spills, non-point source pollution ,or other anthropogenic stressors that may come from outside the parks.
- Determine status through time of morphology, color ratios, and other key parameters describing population status (e.g., size, structure) of the selected intertidal organisms.
- Integrate with and contribute to a monitoring network spanning a broad geographic region, in order to evaluate trends at multiple scales, from the park to region-wide, taking advantage of greater sample sizes at broader scales.
- Detect and document invasions, changes in species ranges, the spread of diseases, and the rates and scales of processes affecting the structure and function of rocky intertidal populations and communities to better understand normal limits of variation.

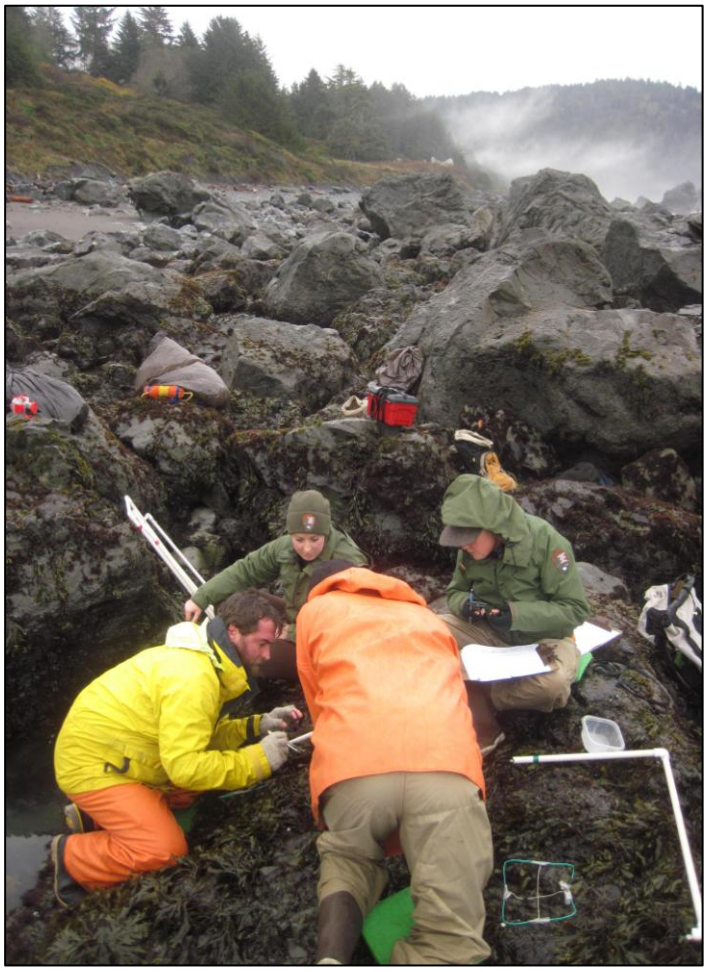

Photo: UCSC and RNSP biologists sampling a photo plot.

Results

We have sampled the 3 existing intertidal sites during the fall and summer seasons since 2006.
The specific measurement and analysis that occurred in the 2010/2011 season included:

- Providing a photographic record of sessile invertebrates and algae using fixed plots (photoplots) as reference.
- Determining the abundance (percent cover) of organisms within select fixed plots
- Within fixed plots, determining the abundance of sea stars, snails, chitons, limpets, and crabs (mobile invertebrates) that may serve as an indicator of overall or specific ecosystem health.
- Determining surfgrass abundance by measuring cover along fixed point-intercept transects.
- Did **not** identify any changes inconsistent with the established baseline conditions that would require management actions.
- Preparing an annual summary report showing data relevance following Park Service Reporting guidelines.

Possible Protocol Additions

Each year a panel of scientists representing the many MARINe partners meets to review existing intertidal monitoring practices as well as assessing any recommend changes or additions to the protocols. This year there was a consensus among the MARINe science panel that monitoring groups should measure mussel size (see pictures below) and bed depth at all sites where mussel photoplots are monitored. The Klamath Network and UCSC will be evaluating the possibility of including theses in the RNSP sampling.

Mussels measurements are proposed for use in Natural Resource Damage Assessment (NRDA) to assess damage and determine recovery after an oil spill. When doing a NRDA, three pieces of information are needed: 1) species composition, 2) abundances, and 3) size distributions. Currently, we collect size data on many mobile critters, but not for any sessile ones. For some species, like barnacles, such measurements can likely be taken from the photoplot pictures. However, for others (mussels, algae) this can be problematic. The proposed mussel measurement protocol provides a method of collecting size and bed depth information without much additional effort.

Another newly proposed protocol for monitoring possible species range shifts is in the trial and review process. This protocol involves keeping track of a list of algae and invertebrate species that are near their listed ranges. Researchers can track these species at monitoring sites along the California and Oregon coast allowing for shifts (i.e., range extensions) to be documented. A list specific to Northern California was used for the fall 2010 and summer 2011 RNSP surveys.

Continued monitoring

The long-term monitoring protocol for the rocky intertidal sites within Redwood National and State Parks was accepted in 2009 and sampling will continue at the 3 monitoring sites twice-yearly. Four researchers from the University of California at Santa Cruz along with 2-3 researchers from Redwood National Park conduct the surveys during a low tide series around December and May each year.

More information about the intertidal monitoring protocols and program can be found at www.piscoweb.org and www.marine.gov

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Measuring Mussel Bed Depth

Measuring Mussel length with calipers